

Amendments to the Drawings

Replacement drawing sheets have been provided. No new matter is introduced. Acceptance of the replacement drawings is respectfully requested.

Fig. 1 has been amended to delete block 74 labeled "SPEAK QUEUE" including blocks 76-1, 76-2 and 76-3 each labeled "RESPONSE". Fig. 1 has been amended to add new blocks labeled "60 CONVERSATIONAL RECORD", "70 DOMAIN MODEL", and "84 RULES BASE (E.G., DATABASE)". New blocks 60, 70 and 84 connect to block 12 of Fig. 1 as originally filed. New block 84 includes a new block labeled "86 GOAL-DIRECTED RULES". These amendments are supported at least by the specification at page 6, lines 12-13, page 14, lines 14-15, and page 17, lines 21-23 as originally filed.

The text "SPOKEN INPUT" within block 14 of Fig. 1 as originally filed has been replaced with the text "SPOKEN UTTERANCE". This amendment is supported at least by the specification at page 6, line 2 as originally filed.

Block 70 labeled "DIALOG MANAGEMENT SYSTEM", including block 56 labeled "DIALOG MANAGER" and block 72 labeled "TURN MANAGER", of Fig. 1 as originally filed has been deleted. New blocks 21 labeled "UTTERANCE REPRESENTATION" and new block 52 labeled "REASONING FACILITY" have been added to block 28 of Fig. 1 as originally filed. These amendments are supported at least by the specification at page 6, lines 8-12 as originally filed.

Block 16 of Fig. 1 as originally filed has been amended to replace the text "AUDIO OUTPUT (E.G., RESPONSE)" with "OUTPUT (E.G., APPLICATION COMMAND)". This amendment is supported at least by the specification at page 6, lines 13-16 as originally filed.

No amendments have been made to Figs. 2 and 3.

The blocks of Fig. 4 as originally filed have been replaced with new blocks 36, 38, 64, 84, 92, 94, 96 and 98, respectively labeled "Task Manager", "Script Engine", "Ontology", "Rule Base", "Reasoning I/O", "Agenda", "Inference Engine", and "Memory". These new blocks and their interconnection is supported at least by the specification at page 18, line 27 through page 19, line 19 as originally filed.

The flow diagram steps of Fig. 5 as originally filed have been replaced with flow diagram steps consistent with the specification as originally filed and summarized below.

Reference numeral 100, pointing to the flow diagram steps of Fig. 5 as originally filed, has been deleted. Step 100 has been added to Fig. 5 as originally filed having the following text: "GENERATE A GOAL DERIVED FROM AN UTTERANCE REPRESENTATION". This amendment is supported at least by the specification at page 21, lines 10-11 as originally filed.

The text of step 102 of Fig. 5 as originally filed has been replaced with the following text: "ANALYZE THE UTTERANCE REPRESENTATION BASED ON THE GOAL AND A SET OF GOAL DIRECTED RULES (AND SUBGOALS IF NEEDED)." This amendment is supported at least by the specification at page 21, lines 24-27 as originally filed.

Step 104 of Fig. 5 as originally filed has been replaced with decision step 104 having the following text: "IS THERE AMBIGUOUS INFORMATION?" This amendment is supported at least by the specification at page 21, line 28 through page 22, line 1 as originally filed.

Step 106 of Fig. 5 as originally filed has been replaced with decision step 106 having the following text: "CAN AMBIGUITY BE RESOLVED THROUGH RECORDS?" This amendment is supported at least by the specification at page 22, lines 1-2 as originally filed.

The text of step 108 of Fig. 5 as originally filed has been replaced with the following text: "ASK QUESTION TO RESOLVE AMBIGUITY." This amendment is supported at least by the specification at page 22, lines 10-11 as originally filed.

The text of step 110 of Fig. 5 as originally filed has been replaced with the following text: "RECEIVE AN UTTERANCE REPRESENTATION BASED ON THE ANSWER TO THE QUESTION." An arrow from step 110 to step 102 has been added. These amendments are supported at least by the specification at page 22, lines 22-25 as originally filed.

Decision step 112 of Fig. 5 as originally filed has been replaced with step 112 having the following text: "INVOKE COMMAND BASED ON THE UTTERANCE REPRESENTATION (E.G., COMMAND DIRECTED TO AN APPLICATION)." The arrow from decision step 112 to step 102 of Fig. 5 as originally filed has been deleted. An arrow to step 112 from a "NO" response to decision step 104 and a "YES" response to decision step 106 of Fig. 5 as now amended has been added. These amendments are supported at least by the specification at page 22, line 25 through page 23, line 13 as originally filed.

Step 114 of Fig. 5 as originally filed has been deleted and the arrow from step 110 to decision step 112 of Fig. 5 as originally filed has been deleted.

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Acceptance of the replacement drawings of Figs. 1-5 is respectfully requested.

Attachment: Replacement Sheets

REMARKS

Claims 1-26 are pending in the Application. Applicants respectfully request entry of the foregoing amendments to the specification prior to further examination. No new matter has been introduced. Acceptance is respectfully requested.

35 U.S.C. 102 Rejection

Claims 1-6, 8-14, 16-22, and 24-26 have been rejected under 35 U.S.C. 102(e) as being anticipated by Abella et al. (US Pat. No. 6,044,347) (“Abella”).

The present invention provides a method and apparatus for converting an utterance representation into a response. In particular, the method and apparatus provide “an intermediate representation between the text of the input utterance and the script of the output actions.” Specification, page 3, lines 6-8.

According to the present invention, a semantic representation of the utterance is first generated. The semantic representation is then fed into a reasoning facility for processing. The reasoning facility includes a “goal-directed rule-based inference engine.” Specification, page 3, line 19. The rules specify how to make particular script calls to achieve specific goals. The inference engine finds rules that can achieve the initial goal of processing the utterance and then creates and pursues subgoals that enable it to apply those rules. While processing the utterance representation, the reasoning facility tries to resolve any ambiguities in the utterance representation and “to fill in any missing information that is needed to achieve its goals and any subgoals.” Specification, page 3, lines 23-26.

The rules represent valid inference steps that the reasoning facility can take in the associated domain. “A rule states that when the condition propositions are satisfied, then the action propositions can be concluded.” Specification, page 19, lines 22-23. A sample rule is shown at page 20, lines 18-25 of the specification as originally filed. Goals are generated in response to user requests and may also be created by the inference engine. “A goal is a proposition that may contain a variable for one or more of its elements.” Specification, page 19, lines 27-28. The reasoning facility scans through the rules in the rule base to look for rules

whose actions match the goal. Once a matching rule has been found, its conditions must be satisfied. Thus, the rule's conditions become new goals for the inference engine to achieve based on the content of the memory and the conversational record. See specification, page 20, lines 4-6.

For example, a user may desire to open a message that is displayed on the screen of a computer. The user would give a verbal command such as "open the message from Jane" and the reasoning facility would receive an utterance representation based on that verbal command. The reasoning facility would set a goal to open the message and would try to satisfy the conditions (i.e., selecting the message based on the message ID) to achieve the goal. The reasoning facility would analyze the utterance representation based on the goal and a set of goal-directed rules to determine that it must set a subgoal based on a rule of determining the message ID for a person (e.g., "Jane"). The reasoning facility would make a call to query the name and address book to find a full name for the first name provided (e.g., "Jane"). The reasoning facility would then set a subgoal based on a rule of determining the full name for the first name. In a particular example, the reasoning facility would determine that there are two possible full names for Jane, that is "Jane Doe" and "Jane Smith." The reasoning facility would then determine that it must disambiguate the name "Jane." Finally, the reasoning facility would ask a question of the user to resolve the ambiguity (e.g., ask the user which "Jane" the user is interested in reading a message from).

In contrast to the present invention, Abella describes an object oriented dialog manager serving as an interface between a user and an application. The dialog manager processes a set of frames characterizing a subject of the dialog where each frame includes one or more properties that describe an object which may be referenced during the dialog. See col. 2, lines 35-43. The dialog manager assigns a weight to each of the properties to indicate the relative importance of the corresponding properties. See col. 2, lines 43-46. The dialog manager uses the weights to determine which of a number of responses the system should generate based on a given user input. See col. 2, lines 46-49. For example, the dialog manager uses the property weights to determine an appropriate question to ask the user in order to resolve an ambiguity that may arise in executing a user request in the application. See Abstract.

Abella does not analyze an utterance representation based on a goal and a set of goal-directed rules to identify ambiguous information or to generate a subgoal. Abella uses various representations including a grammar, frames, and interpretation trees to represent a spoken utterance. See col. 8, lines 53-54. These representations, however, are not even similar to the set of goal-directed rules of the present invention which serve as bases for identifying ambiguous information or for generating subgoals. Abella teaches a hierarchy of frames including one or more properties describing an object or concept. The dialogue manager described in Abella “creates an interpretation tree with the same number of branches as possible interpretations for the utterance.” See col. 9, lines 41-43. Since Abella does not teach, suggest or otherwise make obvious each and every limitation of base claims 1 and 25 as now amended (“analyzing the utterance representation based on the goal and a set of goal-directed rules to identify ambiguous information in the utterance representation or to generate a subgoal; and … generating a response … if ambiguous information is identified”), Applicants respectfully request that the rejection of base claims 1 and 25 be withdrawn.

Base claim 9 has been amended to include limitations similar to base claims 1 and 25 (“analyze the utterance representation based on the goal and the set of goal-directed rules in the database to identify ambiguous information in the utterance representation or to generate a subgoal; and generate a response … if ambiguous information is identified”). Therefore, Applicants respectfully request that the rejection of independent claim 9 be withdrawn.

Base claims 17 and 26 have been amended to include limitations similar to base claims 1 and 25 (“analyze the utterance representation based on the goal and a set of goal-directed rules to identify ambiguous information in the utterance representation or to generate a subgoal; and generate a response … if ambiguous information is identified”). Therefore, Applicants respectfully request that the rejection of base claims 17 and 26 be withdrawn.

Since claims 2-6 and 8 depend from now amended base claim 1, claims 10-14 and 16 depend from now amended base claim 9, and claims 18-22 and 24 depend from now amended base claim 17, Applicants respectfully request that the rejection of these dependent claims be withdrawn for at least the same reasons.

35 U.S.C. 103 Rejection

Claims 7, 15, and 23 have been rejected under 35 U.S.C. 103(a) as being unpatentable over Abella in view of McGlashan ("Towards Multimodal Dialogue Management," Proceedings of the Twente Workshop on Language Technology, 1996.)

As described above, Abella does not teach, suggest or otherwise make obvious each and every limitation of base claims 1, 9 and 17. McGlashan does not add to Abella the present invention "analyzing the utterance representation based on the goal and a set of goal-directed rules to identify ambiguous information in the utterance representation or to generate a subgoal; and . . . generating a response. . . if ambiguous information is identified." Therefore, dependent claims 7, 15, and 23 are allowable for the same reasons. The withdrawal of the rejection of dependent claims 7, 15, and 23 is respectfully requested.

Information Disclosure Statement

An Information Disclosure Statement (IDS) is being filed concurrently herewith. Entry of the IDS is respectfully requested.

CONCLUSION

In view of the above amendments and remarks, it is believed that all pending claims (claims 1-26) as now amended are in condition for allowance, and it is respectfully requested that the application be passed to issue. If the Examiner feels that a telephone conference would expedite prosecution of this case, the Examiner is invited to call the undersigned.

Respectfully submitted,
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